

Vectors Practice Problems  
CP and Honors Physics

1. A boat has a velocity of 13 m/s due west, and the river in which the boat is traveling has a current with a velocity of 4 m/s south and is 1250 m.
  - a. What is the overall velocity of the boat (magnitude, angle, direction)? [13.6 m/s at  $17.1^\circ$  S of W]
  - b. How far does the boat go downstream before it reaches the other side? [384.6 m]
2. Three rods are holding an object that has a weight of 650 N. The rod on the left makes an angle of  $42^\circ$  with the ceiling, the rod in the middle is perpendicular to the ceiling, and the rod on the right has an angle of  $82^\circ$  with the ceiling. Find the tension on each rod. [Left rod force = 323.8 N, Middle rod force = 216.7 N, Right force rod = 218.8 N]
3. A box is being pulled along a horizontal surface with a rope that has an angle of  $35^\circ$  with the horizontal. The box has a mass of 12 kg and a coefficient of kinetic friction of 0.15. If the applied force on the rope is 54 N, what is the acceleration of the box? [2.6 m/s/s]
4. A 10 kg box is stationary on an incline, and the incline has an angle of  $20^\circ$  with the horizontal. What is the coefficient of static friction that exists between the box and the incline? [.364]
5. A rope attached to an engine pulls a 41 kg crate up an  $14^\circ$  incline with an acceleration of 0.63 m/s/s. The coefficient of kinetic friction is 0.21. What is the magnitude of the force that the rope exerts on the crate parallel to the ramp? [204.9 N]